Remarks:

Reconsideration of the application is requested. Claims 24-33 are now in the application. Claim 24 has been amended. Claims 34-38 have been canceled.

Applicant requests an interview with the Examiner by telephone. Please call the undersigned attorney to arrange an appointment. The inventor and foreign counsel might participate in the interview.

35 USC § 101

In item 1 of the Office action, the Examiner rejected claims 35 and 36 as being directed to non-statutory subject matter. Claims 35 and 36 have been canceled. Accordingly, the rejection is now moot.

35 USC § 103

In item 2 of the Office action, the Examiner rejected claims 24-29, 32, 33, and 35-38 as being unpatentable over Payne et al. in view of Gering under 35 USC § 103(a). The rejection has been noted and the claims have been amended in an effort to define more clearly the invention of the instant application. Claim 24 has been amended to include the features of claim 34.

Claim 34 (i.e. amended claim 24) was rejected as being unpatentable over Payne et al. in view of Gering and Pfister et al. under 35 USC § 103(a).

Before discussing the prior art in detail, a brief review of the invention as claimed is provided. Amended claim 24 calls for a method of visualizing a curved layer of a body that includes the following steps:

> providing volumetric data, the volumetric data having first voxels belonging to a reference surface and having two dimensional slices;
>
> pre-processing the volumetric data in a reformatting step including:

> moving voxels outside the reference surface to a common row of one of the slices,
>
> moving voxels outside the reference surface within slice such that respective distances from the reference surface remain unchanged such that all voxels that are equidistant to the reference surface are moved into the common row of the slice;
>
> determining second voxels of the volumetric data having a user selected distance from the reference surface; and
>
> visualizing the second voxels by orthogonal or perspective projection by generating an image of the voxels within common row positions in parallel slices. (Emphasis added by Applicant.)

The subject matter of amended claim 24 relates to the preferred embodiment as described and shown with respect to Fig. 3.

Generally, the invention is directed towards a method of volume visualization of a curved layer of a body. The user can select a distance from a reference surface in order to specify the curved layer to be visualized. The curved layer is then visualized by orthogonal or perspective projection of the thus identified voxels of the curved layer.

Hence, due the nature of the orthogonal or perspective projection a two-dimensional image plane is provided that contains the second voxels even though the second voxels can be distributed over various slices of the original volumetric data set. Hence, the curved layer of the body that can go through a large number of slices of the original volumetric data set is displayed as a flat surface and can thus be conveniently viewed by showing a single two-dimensional image. This provides an intuitive view, which greatly facilitates the work of a radiologist as a pathology is easily noticed.

Payne et al. shows techniques for distance field manipulation of surface models. Various surface manipulation techniques are discussed, such as surface removal, surface interpolation, and surface blending. However, Payne et al. does not disclose using a reference surface for determining second voxels of the volumetric data having a user selected distance from the reference surface and visualizing of the second voxels by orthogonal or perspective projection.

In contrast, the images provided by the surface manipulation techniques devised in Payne et al. provide three-dimensional rendering of such surfaces. This is in contrast to the invention as claimed which provides a flat two-dimensional image of a curved layer of a body which in reality goes through various slices of the original volumetric data.

Likewise, Gering relates only to volume rendering techniques such as discussed under § 3.1.

With reference to language of the claims, according to claim 24, the volumetric data is reformatted by moving the voxels of the reference surface into a common row as shown in Fig. 3 for one of the slices of the volumetric data and by performing the respective move operation for the voxels that are not inside the reference surface while keeping the original distances of these voxels to the reference surface voxels.

Due to this reformatting operation, the visualization of the second voxels can be performed with virtually no computational effort as it is only required to select voxels from the slices that have common row positions for the visualization.

Clearly, the reference does not show a method using a reference surface for identification of second voxels which are then visualized by orthogonal or perspective projection. In contrast, both Payne et al. and Gering teach away from the invention as claimed as some form of volume rendering is always used for visualization.

Accordingly, none of the references, whether taken alone or in any combination, either show or suggest the features of claim 24. Therefore, claim 24 is patentable over the art. Moreover, because all of the dependent claims are ultimately dependent on claim 1, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 24-33 are solicited. In the event the Examiner should still find any of the claims to be unpatentable, please telephone counsel so that patentable language can be substituted.

Petition for extension is herewith made. The extension fee for response within a period of one month pursuant to Section 1.136(a) in the amount of $130 in accordance with Section 1.17 is enclosed herewith.

If any additional extension of time for this paper is required, petition for extension is herewith made.

No additional fee is believed due. However, please charge any required fee (or credit any overpayments of fees) to the Deposit Account of the undersigned, Account No. 50-0601 (Docket No. 7390-X04-030).

Respectfully submitted,

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